SPECIAL TOPIC

Telecom Regulation of Next Generation Network in China

Abstract:
The advent of the Next Generation Network (NGN), a new service-driven network, urges the telecom service operators to consider transforming from single-service providers to full-service providers. During the transformation, they should be concerned about the network user number and the network quality as well as the value added network information. The low threshold for service provision brings a new breed of service providers, which impacts upon the current regulation policy. To adapt to the development of the NGN, it is a necessity to improve the regulation policy in terms of service operators management, user management, Quality of Service (QoS) assurance, service monitoring, charging, and settlement. Meanwhile, regulatory authorities should establish a new body as quickly as possible to meet the trend of the NGN convergence. The new regulatory body would be responsible for regulating operators who will be awarded full-service licenses, and managing new service providers effectively to guarantee the user's interests.

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1 Basic Meaning of the Next Generation Network

The core concept of the Next Generation Network (NGN) as a service-driven network is separating services from the bearer network and rebuilding the bearer network to provide integrated services such as voice, data, and multimedia to meet the users' demands for information communications.

The NGN supports access to various technologies. It provides on-demand Quality of Service (QoS) assurance for bearer resource allocation according to the users' requirements and communications such as person-to-person, person-to-machine, and machine-to-machine communications to meet users' mobility demands. In addition, it realizes the sharing of information resources to provide a wide range of information.

In view of technology, the NGN is a packet-based network able to provide multiple services including telecom services to users and utilizes various broadband with QoS-enabled transport technologies. It realizes the independence of the service function and the transport technology. Followings are the characterization of NGN by the International Telecommunication Union Telecommunication Standardization Sector (ITU-T) and related standard bodies[1]:

- Separation of control functions among bearer capabilities, call/session, and application/service;
- Decoupling of service provision from network, and provision of open interfaces;
- Support for a wide range of services and applications based on service building blocks (including real time, non-real time, streaming, and multimedia services);
- QoS guarantee from end to end and capabilities of transparency transport;
- Interworking of legacy networks and open interfaces;
- A variety of identification schemes that can be resolved to IP addresses for the purposes of routing in IP networks;
- Unified service characteristics for the same service;
- Supporting generalized mobility and fixed-mobile convergence;
- Independence of service functions from transport technologies and unfettered access by users to different service providers;
- Compliant with all regulatory requirements such as concerning emergency communications, security, and privacy.

2 Obstacles to Service Convergence

Presently, as the telecom market in China trends to saturation, attracting users merely by improving network QoS and lowering rates in the initial phase that can hardly help telecom operators to increase profit. This has been proven by the phenomenon of increase in production quantity without revenue in the industry. To increase profit growth, Chinese

telecom operators put forward the converged services represented by IPTV in the NGN architecture as an important move for revenue growth and enterprise transformation. In addition, the unified core network and service bearer platform emphasized in the NGN architecture become main methods to cut expenditure and increase productivity.

The improvement of NGN for more services makes it possible to integrate the three networks, which is the main development direction of current information industry in China. The NGN is intended to meet users' demands for integrated services such as voice, data, and multimedia. Therefore, the NGN lays a solid foundation for the realization of the three networks convergence. The promotion of NGN-based service convergence in China, however, is confronted with the following obstacles.

2.1 System

The trend of service convergence requires that many countries adjust their telecom regulatory authorities to integrated information regulatory authorities, conducting unified regulation of the telecom network, the Internet and the wireless TV network according to the characteristics of information services. For example, UK adjusted its UK Office of Telecommunications (OFTEL) to Office of Communications (OFCOM) and brought the regulation of information-based telecom, TV and such into the scope of OFCOM in a wider sense. In the early stage, for many reasons, no management system reformation of the information service industries was implemented effectively in China. Therefore, specialized regulation still prevails in the information industry and there is an urgent need for a unified regulatory authority. With the concept of specialized regulation, it is hard to keep pace in development levels, policies, and technical standards for the three networks, thus affecting the growth of the service convergence based on information contents.

2.2 Policy

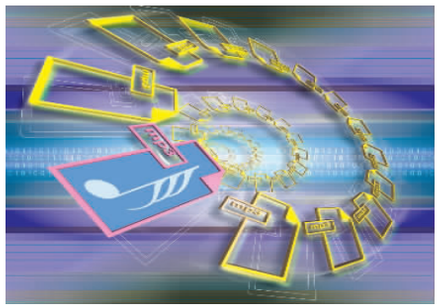
In 1999, the General Office of the State Council issued the Notification on the Enhancement of the Management in Radio and Television Transport Network Construction (No.82 of the State Council in 1999) to the Ministry of Information Industry and the State Administration of Radio, Film and Television to prevent large-scale redundant construction. The seven years since the issue of the policy has witnessed huge changes in information technologies. It is especially worth noting that the NGN provides integrated services on the existing transmission lines through simple technical reconstruction instead of traditionally providing services on different transmission lines, thus avoiding redundant construction. Presently, however, the national authority persist to the clause of "No telecom departments are allowed to engage in broadcasting and television service, and no broadcasting and television departments are allowed to engage in telecommunication service"[2]. It is the base line of service management, which has become a major obstacle in the development of service convergence.

2.3 Security

The emergence of integrated services allows the current users to receive information in numerous ways and obtain QoS of telecommunication business in various operation modes, which will increase the number of information receivers and providers. In service provision, a high requirement is imposed on the security of information production and communication. It is an important management content of the national ideology. Presently, there is no perfect management means and methods of the information contents in China and most information contents are managed in a unified matter. In fact, the security requirement of non-profit organizations is over emphasized but the development of profit industries and the diversity demand of users for information contents are neglected, which affects the promotion of NGN integrated services.

3 Full-service Development Trend

In present NGN research, the ubiquitous communication demand is treated as the trend of future information communication. This demand, however, will not be met without the support of



generalized mobility by NGN. In the challenge of the replacement of the traditional fixed-line phone by the mobile phone, China's fixed-line operators have commenced researching Fixed-mobile Convergence (FMC) based on the technical features of NGN.

After research on NGN, ITU-T improves the definition of FMC[3] as "a mechanism adopted by the operator in the given network environment, providing services and applications to users whatever the locations and access technologies are."

The FMC reflects the concept of "service provision independent of the access technology" and caters to the fixed-line operators in need of transformation to full-service providers.

Considering of China's research, the understanding of FMC includes two levels.

First, considering the possibility of the transformation of traditional telecom operators to full-service operators, FMC shall be rooted in the existing network and exert the advantages. With various access technologies, FMC shall be able to improve user experience through network reconstruction when providing services to users. The existing networks will evolve into a unified core network through continuous reconstruction.

Second, potential operators can build unified core network such as an IP Multimedia Subsystem (IMS) core network, according to a target-oriented standard to meet the users' need of using services via fixed or mobile access.

By meeting users' demands, FMC can provide a good experience when using services. As a new service form, FMC will be among the major means for the traditional telecom operators to attract users. We can say that FMC is the inevitable trend of NGN in terms of

service development.

With the growing applications of NGN technology in telecom networks, whether FMC can be provided smoothly consists in how the government will adjust the current regulatory policy to meet the demand of the development of FMC. That is whether the government will break the current specialized operation mode and award both the traditional fixed-line and mobile operators full-service licenses. In addition, when users choose fixed-line or mobile services from different operators, an effective regulation system is an important guarantee for the smooth implementation of services.

4 Impacts on Regulation

The separation of NGN services and bearing lowers the entry threshold for traditional service providers. Traditional service provision does not need to over-depend on the network infrastructure to bring a new breed of traditional service providers. The impacts of the changes brought by NGN on the current regulatory policy are embodied in the following aspects.

4.1 Management of Service Operators

With the threshold of low technical entry of service provision, a new type of operator—service operator will emerge, which may cause the separation between the network and the service. The new service operator can enter the network via the third party's application gateway, use the network resources provided by the network operator, and operate the relevant services via the third party's application server. The service operator will be a brand-new network operation entity and there is still no regulation experience or policy on such kind of operator yet. It has become a new challenge for the present regulatory body how to achieve a settlement between the service operator and the network operator and how to regulate the service operator from the perspective of protecting users' interests.

4.2 User Management

Since NGN is not a closed network anymore operating independently, users can access NGN via Internet. Consequently, some nodes of NGN might be exposed to Internet and prone to be attacked by intelligent terminals. The security of NGN is lower than that of a traditional telecom network. Presently, the security problem of an IP network has become a hidden trouble NGN is facing. The security of the core device, the access device, the information, and the network has become an important problem that affects NGN security.

As NGN users use the IP address when logging in to NGN and using services, it is difficult for NGN to manage its users. The NGN is unable to trace the IP address as effectively as a traditional telecom network due to the limited technology.

4.3 QoS Assurance

Users can access NGN through different access resources at the access layer. These access resources might belong to operators other than the service provider who cannot directly control the access resources of other operators. Therefore, the service provider fails to provide effective QoS assurance for the users that access the NGN via the access resources belong to other providers.

The NGN QoS is guaranteed by the service-layer QoS and the bearer-layer QoS, and the service-layer QoS is guaranteed by the bearer-layer QoS which lacks effective regulation means but just has some rigid indexes. Consequently, it is difficult to guarantee the NGN QoS.

4.4 Service Monitoring

The NGN provides services flexibly. It can provide services via the core device, the application server, the traditional intelligent network, the third-party application server, or by the combination of Internet and any of the foresaid. The participants of service provision include network operators, Internet access providers, service providers, content providers, and others. It is very difficult to monitor services due to the complicated service flow, the packet transporting and too many operational entities involved.

4.5 Service Billing and Settlement

The NGN supports a variety of services. It provides multimedia service integrating voice, data, and video. As there are no effective standards of billing contents and formats for the multimedia services, it is difficult to achieve settlement between operators.

5 Regulation Rules

The Chinese telecom industry is still in the stage of multi-target management, that is, the target that stated in the Chinese telecom regulatory policy is not the sole target. Presently, tie regulatory policy includes two targets. One is to ensure users' interests by adjusting the relationship between operators and users. The other is to promote fair market competition and industrial development by adjusting the relationship between operators. In the current situation, when establishing the regulatory policy with the introduction of NGN, China must conform to rules. Such rules are as ensuring telecom consumers' interests, promoting telecom industry development, keeping fair competition, ensuring network and information security, and guaranteeing the national interests.

5.1 Ensuring Telecom Consumers' Interests

By making a general survey of the telecom laws throughout the world, first priority is always given to users' interests, which should be the same in China when establishing NGN regulatory policies. The NGN service will be developed and the NGN market will be cultivated and improved only when consumers' interests are ensured.

5.2 Keeping Fair Market Competition

To ensure the normal telecom market and promote the growth of it, no unfair environments of competition are allowed among operators when they provide similar services through different technologies. When establishing regulatory policies, the regulatory authorities shall conform to the principle of technical neutrality. They need not only consider the consistency of policies and the drive of the industry, but also treat the promotion of fair market competition and cooperation of all the parties in the industrial chain as an important factor.

5.3 Guaranteeing National Interests

Whatever policies China establishes, the

national interests must be put first. When establishing the NGN regulatory policy, one of the compulsive rules the regulatory authorities must follow is ensuring the national interests. It covers three levels of concepts:

(1) How to ensure the public security and the network information security;

(2) How to adapt to the development of international services and international telecom environment with the aim to protect Chinese enterprises' interests by setting barriers and to improve the competitiveness of Chinese information industry in the international environment;

(3) How to establish regulatory policies with the aim to promote the industrial technology development, exploit the advantages of idle assets, and bring higher profit margin by making full use of the existing network resources.

6 Conclusions

With the maturity of NGN technology, commercial trials are promoted in operational enterprises and the relevant services are increasingly accepted. China's regulatory authorities shall consider the following aspects to ensure the rapid development of NGN services and build a healthy information service industrial chain.

(1) Systems

China shall establish regulatory authorities that adapt to the NGN convergence trend to manage integrated services based on information contents. The authorities shall ensure not only the security of information production and delivery, but also the growth of the chain of information service industry.

(2) Polices

With the growth of NGN services and the forthcoming deployment of 3G services, the department in charge of information industry shall consider as quickly as possible the regulation problem for operators will be awarded full–service licenses. It is necessary, in a proper time, to change the way in which the mobile services are regulated merely through frequency management.

(3) QoS

A series of changes brought by NGN technology lower the technical entry threshold of service operation. In the future regulation of NGN services, the operational entities shall be managed effectively to guarantee the QoS of new services. Meanwhile the old services with regulations are regulated in the present way.

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Biography

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Roundup

ZTE High–end Routers Product Enters European Market

ZTE Corporation, the fastest growing global telecommunications equipment and network solutions provider, has been awarded a contract to provide high–end router and switching products to Vestitel, a subsidiary of Bulgaria's largest natural gas company Overgas, helping Vestitel to expand its triple–play network from the country's capital city Sofia to four other major cities, Varna, Bourgas, Rousse and Veliko Tarnovo.

The operator's current network, also from ZTE, has been providing Internet access, VoIP and IPTV services to subscribers since its completion in 2006. The expanded network will provide more advanced voice and video services such as corporate Internet and Visual Private Internet (VPN) services to a larger number of subscribers. It will consist of a controllable IP bearer network solution featuring high performance, high reliability, large bandwidth and QoS assurance.

ZTE R10 series products used in the system will include the ZXR10 T64E and GER routers and T64G and T40G switches.

"Compared to traditional Layer 3 switching architecture network, our proposed routing architecture network can provide a better networking solution for integration between national IP backbone network and metropolitan area IP networks, thus guaranteeing end–to–end QoS, powerful multicast and Multiprotocol Label Switching (MPLS) features, and helping Vestitel implement triple play and MPLS VPN services quickly and effectively," said Zhang Chengbin, international marketing director of ZTE's Data Division.

As a leading telecom manufacturer, ZTE has a full range of stable, reliable and customized data communications products including routers, Ethernet switches, broadband remote access servers and network management systems. According to CCID Consulting, in the first half year of 2006, sales of ZTE's data products increased 200% compared to the same time the previous year and ZTE became one of the top three companies in the enterprise network market in China. Overseas, ZTE data products have been used to construct backbone networks, Metropolitan Area Networks (MANs) and enterprise networks in over 30 countries and regions including Hong Kong, Thailand, Greece and Colombia. (ZTE)